Ten Questions About Numbers: A College Writing Assignment

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This paper examines a writing assignment in a college algebra course. Each student picked a number from a list including the digits 0 through 9, ϕ, googol, ℵ0, and others. Each wrote a paper answering three questions from a list of ten, such as "How old is this number?" and "What are some examples of this number in art?" Students shared their papers through oral presentations in class. The assignment sought to increase interest in mathematics, to provide cultural content within the algebra course, and to have students discover some of the beauty of mathematics. This paper describes some answers the students gave, student feedback about the assignment, and the instructor's thoughts about the assignment.

Introduction

In the fall of 2008, college algebra students received an assignment to write a paper and give an oral presentation. They received a list of numbers and a list of ten questions about those numbers. The project encourages students to study cultural and historical aspects of mathematics.

The List of Numbers

The list of numbers included the digits 0 through 9, several other integers, a telephone number disguised as a large integer, a fraction, 3, and some less familiar numbers such as i, π, e, ϕ, googol, and ℵ0. The questions were not strictly mathematical and included the following:

- How old is this number?
- What is the cultural significance of this number?
- Where was this number first used?
- What are some examples of this number in art, to include painting, sculpting, music, architecture, dance, etc.?

The variety of questions allowed students to demonstrate their passion for or knowledge of other academic disciplines through the project.

Sources of Information

Students were encouraged to begin with an internet search, including *Google, Wikipedia*, or Wolfram Research's *Mathworld*. However, they had to reference a printed resource as well. Since most students were also enrolled in a freshman English course, they used that department's style manual. In this case, that was the MLA *Handbook for Writers of Research Papers*. The assignment made clear that this manual was not standard for math papers, but its use saved time and frustration in a freshman general education course.

Classroom Logistics

There are two points to consider when letting students choose their numbers. First, tailor the list of numbers to the class size. With more students than numbers in the list, identify in advance which numbers may be chosen by more than one student. Otherwise, many will choose one of the numbers 1, 2, or 3, and the presentations will be repetitive. For a smaller class, remove whatever numbers the instructor deems least interesting from the list. Second, students should choose their numbers early enough in the semester to complete the oral reports, but late enough to avoid

the add-drop turbulence of the beginning of the semester. Otherwise, the class will miss hearing about interesting numbers chosen by students who drop the course. The following schedule seems to work: distribute the assignment at the first exam; choose numbers at the next class meeting; begin oral reports the week after that. Continue with one or two reports at the beginning of each class meeting during which there is no exam.

Assessment Considerations

Avoiding use of class time discussing composition or conventions of style in research papers made it somewhat unfair to grade papers based on these criteria. Accordingly, the grading rubric was fairly objective, and it was included with the assignment. It evaluated whether a paper identified the student's number, identified the student's chosen questions, provided the answers to the questions, satisfied the length requirement, and documented sources properly. Grammar, spelling, and punctuation accounted for 20% of the grade. Instructors' opinions about the weighting will differ, but the point is that with clear grading criteria in advance, students met the requirements of the assignment.

The instructor learned some things from the students, and several of them performed at a level to which the standard course content did not inspire them.

Student Responses

Some students' answers were expected. In fact, several numbers made it into the list with certain answers in mind. For example, the student who chose 0 explained that it is a fairly young number, and more than one student alluded to the significance of 7 and 40 in Judeo-Christian culture. However, some answers were surprising. Two answers about numbers in art were "3 appears in a poem in the film Harold and Kumar Escape from Guantanamo Bay" and "Stephen Wright once stated, 'Black holes are where God divided by zero.'" Also, one student mentioned the equation $e^{i\pi}+1=0$ in her discussion of the arithmetic properties of π. This beautiful equation is beyond the scope of a college algebra course, but the writing assignment exposed students to it in a natural way.

Student Evaluation

Students completed an evaluation of the project, and the results were positive. Students felt that they learned in an enjoyable way. On a scale of strongly agree through strongly disagree, students predominantly agreed or strongly agreed with the following statements:

- I learned something interesting.
- I learned things I was not looking for.
- I learned from my classmates' oral reports.
- I learned about a culture besides my own.
- This project was worthwhile.

Five students provided written comments. One wrote, "I enjoyed research & paper. Very interesting. But I did not like presenting." Another wrote, "While I felt this project was a welcome relief to the usual drone of mathematics classes, my lack of interest in my particular number made it rather boring. Perhaps the inclusion of more numbers to choose from would improve it. I thoroughly enjoyed the oral presentation. Overall, a good project." The prevailing sense was that most students did not love everything about the project, but most liked something about it.

Conclusions

Finally, this project was enjoyable to administer. The instructor learned some things from the students, and several of them performed at a level to which the standard course content did not inspire them. It allowed discussion of interesting topics without distracting students from the core material of a multi-section course

with a common final exam. Most importantly, students learned and acknowledged the fact that they did.

For More Information

The complete assignment, grading rubric, and results of the student evaluation of the project are available at http://www.utm.edu/staff/selliott/Teaching/MA140/Math%20140.htm. Ω

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